

APPLICATION FOR UNITED STATES LETTERS PATENT

by

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for a

**METHOD AND SYSTEM FOR DELIVERY OF
A CALLING PARTY'S LOCATION**

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Network System is described in U.S. Patent No. 5,701,301 and U.S. Patent No. 5,838,774, which are hereby incorporated by reference in their entirety.

Referring to Figure 1, CNAM is typically implemented in the following manner. A calling party 101 picks up the telephone and dials the directory number of a called party 102, which is 404-555-2222. Called party 102 is a CNAM subscriber having a CNAM display unit 116. CNAM display unit 116 could be separate from or integral to the device of called party 102. After calling party 101 dials the directory number, an central office 104 (also referred to as a service switching point) serving calling party 101 obtains routing information and populates an initial address message (IAM) with certain information. The IAM is a parameter that exists within an integrated services digital network user part (ISUP) signaling message. The IAM is a defined message type from TR-NTW-000246 and ITU Q.764/Q.767, and is one of a sequence of messages used in ISUP trunk signaling. An ISUP signaling message employs a Common Circuit Signaling System 7 (CCS7) call setup protocol. In particular, the IAM is populated with the directory number of calling party (404-555-1111), the directory number of the called party (404-555-2222), and a presentation parameter. In this case, the presentation parameter allows a CNAM display.

Central office 104 then sends this routing information in the signaling message to a central office 106, which serves called party 102. Recognizing that the call is for a CNAM subscriber, central office 106 halts the calling process to launch a calling name query 150 on the CCS7 network. As a part of the query launch,

central office 106 populates a called party address parameter in query 150 with the directory number of calling party 101, in this case 404-555-1111. The called party address parameter is a routing parameter within an Advanced Intelligence Network (AIN) query package.

5 After central office 106 has populated the called party address parameter, calling name query 150 is sent to a signaling transfer point (STP) 108. STP 108 performs a global title translation (GTT) on the called party address parameter to determine to which service control point (SCP) calling name query 150 should be routed. This determination is made based on the first three digits (the numbering
10 plan area, or NPA) in the directory number of calling party 101, which in this case is 404. STP 108 then forwards the calling name query to the appropriate SCP 112 through CCS7 Network 110. SCP 112 searches a CNAM database 114 for calling party's record from which SCP 112 retrieves the associated name. CNAM database 114 is preferably a part of SCP 112, as shown in Figure 1, but may be separate from
15 SCP 112, or incorporated as part of another network element such as a service node or a switch.

SCP 112 returns the name associated with the directory number of calling party 101 in a transaction capability application part (TCAP) response 151 to central office 106 through CCS7 Network 110 and STP 108. TCAP response 151 is
20 the final message containing instructions on how to handle the call. TCAP response 151 ends the SSP/SCP transaction that began with calling name query 150. In this

example, the full name of calling party 101 is returned in TCAP response 151 to central office 106.

When central office 106 terminates the call to called party 102, central office 106 sends the name of calling party 101 and the directory number of calling party 101 (404-555-1111). Central office 106 sends this information over called party's line to called party's display unit 116. The information is then displayed on called party's display unit 116, along with the date and time of the call (generated by display unit 116).

The principal advantage of conventional CNAM services is the ability to screen calls. Upon receiving a call, a called party can review the information on the display unit and decide whether or not to answer the call. However, users wanting to screen calls and fulfill other location-sensitive purposes often prefer to know more about the calling party than just name, number, date, and time. For instance, a service dispatcher monitoring the activities of his service technician may wish to receive the exact location of his technician each time the technician calls in, so as to facilitate efficient scheduling of the next assignment. Although the name and number on the CNAM display unit could possibly provide clues to the technician's location, the dispatcher would prefer seeing a more precise and easily understandable description of location, *e.g.*, a street address or building name. Thus, although the typical CNAM information may be suitable for simple call screening, many telephone users would prefer to receive even more information about the calling party.

SUMMARY OF THE INVENTION

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The present invention is a method and system for providing a service that delivers location information associated with a caller. The service operates in both wireline and wireless networks, providing called parties with the location information of calling parties who use either stationary or wireless telephones. The service can operate as a stand alone service or can be a part of a CNAM service, delivering location information in addition to the conventional name, number, date, and time. In conjunction with any call, the present invention reports to the called party the location from which the calling party is calling. Therefore, a subscriber can use the valuable location information to better screen calls and to fulfill other location-sensitive purposes.

The primary components of the present invention include a service control point, an address database in communication with the service control point, and a network that tracks the locations of network users. The service control point operates within a PSTN in cooperation with other AIN components, such as signal transfer points and service switching points. The address database operates within the location-tracking network and allows access by the service control point to its contents. The location-tracking network interfaces with the PSTN to terminate calls between location-tracking network users and PSTN users. For example, for a wireline network, central offices provide this interface. As another example, for a wireless network, mobile switching centers (MSCs) provide this interface. As

another example, for voice over Internet protocol (VoIP) calls, an Internet protocol network and an IP-to-PSTN gateway provide the interface.

5 The service control point performs service logic in response to a query requesting the location of a calling party. The service control point can also execute logic in response to a query for the caller name. The service control point accesses the name database (for CNAM) and the address database (for location information delivery). In response to queries, the service control point also returns routing instructions to direct the service switching points how to terminate a call and to provide CNAM and location information for presenting on a display unit.

10 The address database cross-references location information with directory numbers, listing location information for every directory number. These directory numbers (commonly referred to as telephone numbers) correspond to stationary terminal devices (e.g., telephones connected to the wireline network) and to mobile devices (e.g., cellular telephones). For stationary terminal devices, the location-tracking network records each entry in the address database upon service activation
15 and does not change the entry unless the terminal device is disconnected and/or moved. For mobile devices, the location-tracking network periodically updates entries in the address database, changing the location information as the mobile devices move from place to place.

20 The location-tracking network is a call carrier that tracks the locations of its users and maintains the information in the address database. For example, the

location-tracking network could be a wireline network that records the location of stationary terminal devices upon service activation. As another example, the location-tracking network could be a conventional wireless network providing such services as paging, digital cellular, and personal communications services (PCS). To track location of wireless network users, the wireless network would use, for example, handheld device location systems or network-based location systems. As another example, the location-tracking network could be an Internet protocol network, in which location could be an email address.

Together, in the context of a call, these components deliver the location of a calling party to a called party for presentation to the called party using such media as textual displays, graphical displays, and audio messages. The methods by which the locations are delivered vary depending on whether the calling party is using a stationary terminal device or a mobile device. Broadly stated, the method of the present invention for delivering a calling party's location in the context of a call from a stationary terminal device includes receiving the call at a service switching point, activating a trigger set for calls to a location delivery subscriber (the called party), sending a query to the service control point requesting location information, searching the address database for the calling party's directory number to determine the calling party's location, returning routing instructions and the calling party's location to the service switching point, routing the call to the called party, and displaying the calling party's location on the called party's display unit. Alternately, the method could also include searching a name database in

communication with the service control point for the calling party's number to determine the calling party's name, returning the calling party's name, and displaying the calling party's name on the display unit.

In the context of a call from a mobile device, the method of the present invention generally includes determining the calling party's location using a location system of the location-tracking network, recording the calling party's location in the address database with an associated identifier (e.g., Mobile Identification Number, or MIN), forwarding the call to a service switching point of the PSTN, activating a trigger set for calls to a location delivery subscriber (the called party), sending a query to the service control point requesting location information, searching the address database for the calling party's directory number to determine the calling party's location, returning routing instructions and the calling party's location to the service switching point, routing the call to the called party, and displaying the calling party's location on the called party's display unit.

Preferably, the location system records the calling party's location in a way meaningful to the location delivery subscriber of the location information delivery service. For example, location information could include street addresses, landmarks, or building names. However, if the location system provides less descriptive location information, this method may also include the step of converting the location information provided by the location system into a more meaningful description or a description better suited for displaying on a display

unit. For example, if the location system merely provides position coordinates, the service control point could use a mapping converter to translate the position coordinates received from the address database into a street address or building name for display on the display unit.

5 Alternatively, in addition to location delivery, the present invention could also include searching a name database in communication with the service control point for the calling party's identifier to determine the calling party's name, returning the calling party's name, and displaying the calling party's name on the display unit.

10 Accordingly, it is an object of the present invention to provide a subscriber with the location of a calling party.

Another object of the present invention is to provide location delivery subscribers with easy to understand location descriptions.

15 Another object of the present invention is to provide a location delivery service for both wireline and wireless network users and for both stationary terminal devices and mobile devices.

These and other objects of the present invention are described in greater detail in the detailed description of the invention, the appended drawings, and the attached claims.

DESCRIPTION OF THE DRAWINGS

Figure 1 is a prior art schematic diagram illustrating the CNAM operating environment.

Figure 2a is a schematic diagram of a system architecture that provides location delivery for calling parties using stationary terminal devices, according to a preferred embodiment of the present invention.

Figure 2b is a flowchart, corresponding to Figure 2a, outlining the method steps for delivering the location of a calling party using a stationary terminal device, according to a preferred embodiment of the present invention.

Figure 2c is a schematic diagram of a system architecture that provides location delivery for calling parties using stationary VoIP terminal devices, according to an alternate preferred embodiment of the present invention.

Figure 3a is a schematic diagram of a system architecture that provides location delivery for calling parties using mobile devices, according to a preferred embodiment of the present invention.

Figure 3b is a flowchart, corresponding to Figure 3a, outlining the method steps for delivering the location of a calling party mobile devices, according to a preferred embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

The present invention is a location delivery service for called parties. The invention provides subscribing called parties with location information about calling

parties, for both stationary terminal devices (e.g., wireline) and mobile devices (e.g., wireless). The location delivery service enables a subscriber to more effectively screen calls and to satisfy other location-sensitive purposes. The present invention contemplates future enhanced digital cellular networks that will track the identity and location of each wireless network user.

5 The system of the present invention provides location delivery using at least a service control point, an address database in communication with the service control point, and a network that tracks the locations of network devices. If the location-tracking network provides location information in a form unsuitable for display on a display unit, the system further includes a mapping converter in communication with the service control point. The method of the present invention varies according to whether a calling party is a stationary terminal device (e.g., wireline) or a mobile device (e.g., wireless). The system architecture of Figure 2a and the corresponding flowchart of Figure 2b illustrate the location delivery service for a wireline call from a stationary terminal device, according to a preferred embodiment of the present invention. The system architecture of Figure 3a and the corresponding flowchart of Figure 3b illustrate the location delivery service for a wireless call from a mobile device, according to another preferred embodiment of the present invention.

20 Referring to Figure 2a, the primary components of the stationary terminal device embodiment of the present invention include SCP 200 and address database 202. Address database 202 is a part of location-tracking network 201 and contains

a location description for the location-tracking network terminal devices (*e.g.*, telephones) organized by directory number. SCP 200 is in communication with address database 202 and is specially programmed to perform location delivery logic. Specifically, in response to a query requesting location information, SCP 200
5 reads the calling party information embedded in the query, and consults address database 202 for the calling party's location (*i.e.*, the location of the calling party's wireline network terminal). SCP 200 returns routing instructions including the location of the calling party. Optionally, the query also asks for call name delivery information, in response to which SCP 200 consults name database 114 for the
10 calling party's name and SCP 200 returns the name and telephone number of the calling party along with the location information.

Address database 202 and name database 114 are preferably maintained by location-tracking network 201 as shown in Figure 2a, whereby network user names and locations are stored upon service activation and SCP 200 is given access to the
15 information. Alternatively, the network of SCP 200 could maintain address database 202 and name database 114.

Based on the system architecture shown in Figure 2a, a preferred embodiment of the present invention delivers the location information of a calling party using a stationary terminal device according to the method shown in Figure
20 2b. Although this method describes location information delivered in the context of CNAM, the present invention could provide location delivery wholly separate from a CNAM service. In addition, while the system operation described herein and

illustrated in the diagrams and flowcharts contains many specific details, these specific details should not be construed as limitations on the scope of the invention, but rather as examples of preferred embodiments thereof. As would be apparent to one of ordinary skill in the art, many other variations on the system operation are possible, including differently grouped and ordered method steps. Accordingly, the scope of the invention should be determined not by the embodiments illustrated, but by the appended claims and their equivalents.

Referring to Figures 2a and 2b, in step 260, calling party 101 dials the directory number of a called party 102 (404-555-2222). Called party 102 is a CNAM subscriber having a display unit 117. In step 262, central office 104 serving calling party 101 obtains routing information, populates an initial address message (IAM) with the directory number of calling party 101 (404-555-1111), the directory number of the called party 102 (404-555-2222), and a presentation parameter (in this example) that allows a CNAM display. In step 264, central office 104 sends this routing information in the signaling message to central office 106, which serves called party 102.

In step 266, the signaling message activates a trigger on central office 106 set for calls to a CNAM and location delivery subscriber (the called party). The trigger launches a query 250 asking for the name and location of the calling party, and including in the called party address parameter the directory number of calling party 101, 404-555-1111. In step 268, central office 106 sends query 250 to STP 108, which performs a global title translation on the called party address parameter

and determines that query 250 should be routed to SCP 200. STP 108 then forwards the query 250 to SCP 200 through CCS7 Network 110 in step 270.

In response to query 250, in step 272, SCP 200 searches name database 114 for calling party 101's record, from which SCP 200 retrieves the associated name.

5 SCP 200 also searches address database 202 for calling party 101's record from which SCP 200 retrieves calling party 101's location information.

In step 274, SCP 200 returns the name and location associated with the directory number of calling party 101 (along with call routing instructions) in a transaction capability application part (TCAP) response 251 to central office 106 through CCS7 Network 110 and STP 108. In step 276, central office 106 terminates
10 the call to called party 102, sending the name, directory number, and location of calling party 101. Finally, in step 278, the information, including the location of calling party 101, is displayed on called party's display unit 117. Display unit 117 also generates and displays the date and time of the call. Thus, for the wireline
15 call, called party 102 knows the location of calling party 101 before answering the telephone call.

Although called party 102 is depicted as a wireline device in Figure 2a, one of ordinary skill in the art would appreciate that called party 102 could also be a wireless network user to which SCP 200 delivers location information. In such a
20 case, the system architecture would preferably include a mobile switching center (MSC) between central office 106 and called party 102. The location information originating from SCP 200 would pass through CCS7 Network 110, STP 108, central

office 106, the MSC, and onto the called party 202. Also, preferably display unit 117 would be integral to the device of called party 102.

In addition, although calling party 101 is shown as a part of a separate location-tracking network 201 in Figure 2a, one of ordinary skill in the art would appreciate that calling party 101 could be within the same network as called party 102. In such case, address database 202 and name database 114 would also be within the same network.

In an alternate preferred embodiment of the present invention, the calling party is a stationary VoIP telephone, instead of a stationary wireline telephone, and the location-tracking network is an IP network (shown generally as 299). As shown in Figure 2c, VoIP telephone 290 is in communication with IP network 292. IP network 292 is in communication with name database 114 and address database 202 and maintains the information within the databases. To facilitate calls to and from the circuit-switched PSTN network, IP network 292 is in communication with central office 106 through gateway 294. Gateway 294 handles IP to PSTN conversions. Within this IP/PSTN system architecture, the method for delivering location information is as described above for the stationary wireline telephone, in Figures 2a and 2b.

Figure 3a illustrates a system architecture that provides location delivery for calling parties using mobile devices, according to a preferred embodiment of the present invention. As shown, the primary components of the mobile device embodiment of the present invention include SCP 300 and a location-tracking

typical user. For example, if wireless network 302 furnishes GPS coordinates, mapping converter 304 could translate coordinates X-Y into "101 Park Place." In this manner, SCP 300 reads the location data provided by wireless network 302, as translated (if necessary) by mapping converter 304, and delivers the location
5 information to display unit 117.

Although Figure 3a shows mapping converter 304 as a separate component within the PSTN network, one of ordinary skill in the art would understand that the functions and structure of mapping converter 304 could be located in several different places. For example, mapping converter 304 could be located within SCP
10 300 or within name database 114. As another example, mapping converter 304 could also be located within wireless network 302, in communication with location system or as part of location system. Regardless of where mapping converter 304 is provisioned, the desired end result is to deliver displayable location information to display unit 117.

15 In tracking the location of network devices, wireless network 302 determines the location of a network device during origination of the call from the calling party, and records the location data in address database 202. To obtain the location data, wireless network 302 uses any suitable location system. Examples of suitable location systems include handheld device location systems and network-based
20 location systems. One example of a handheld device location system is a GPS mounted in a cellular telephone. Examples of network-based location systems include triangulation systems and Wireless Application Protocol (WAP) location

systems. Depending on the desired degree of accuracy, one or both of the location systems can be used to determine a device's location.

Suitable WAP location services are described in WAP version 1.1, which is herein incorporated by reference in its entirety. WAP is an application environment and set of communication protocols for wireless devices designed to enable manufacturer-, vendor-, and technology-independent access to the Internet and advanced telephony services. WAP provides wireless Internet access through all digital cellular networks, giving network users a menu driven method for downloading information, such as flight schedules and bank account balances, to wireless devices from the Internet.

The present invention will enjoy widespread application as location-tracking networks continue to emerge. In particular, the present invention will take advantage of location data provided by federally mandated enhanced wireless 911 (E911) services. E911 services help ensure that wireless telephones provide 911 call centers, or Public Safety Answering Points (PSAPs), with vital information necessary to locate and identify a caller in an emergency. To comply with E911 standards promulgated by the Federal Communications Commission (FCC), wireless network providers will soon be required to track the location and identity information of all wireless callers, with the purpose of providing such information to emergency personnel when a caller dials 911 from a wireless telephone. The FCC's wireless E911 rules require certain Commercial Mobile Radio Services (CMRS) carriers to begin transmission of enhanced location and identity information in two

phases. Phase I requires carriers to transmit a caller's telephone number and general location to a PSAP. Phase II requires carriers to provide more precise location information to the PSAP. Thus, the present invention will parlay the location data obtained for the mandated E911 location tracking systems into
5 valuable location information for the benefit of all location delivery and CNAM subscribers.

Based on the system architecture shown in Figure 3a, a preferred embodiment of the present invention delivers the location information of a wireless calling party according to the method shown in Figure 3b. Although this method
10 describes location information delivered in the context of CNAM, the present invention could provide location delivery wholly separate from a CNAM service. Referring to Figures 3a and 3b, in step 360, calling party 101 dials the directory number of a called party 102 (404-555-2222) using a wireless device that is part of location-tracking wireless network 302. Called party 102 subscribes to location
15 delivery and CNAM and has a display unit 117. In step 362, if wireless network 302 includes a handheld location system, the wireless device of calling party 101 forwards the location information to wireless network 302, which records the location information in address database 202. If wireless network 302 includes a network-based location service, the network-based location system determines the
20 location of the handheld device and records the location information in address database 202.

data to mapping converter 304, which translates the location data into a descriptive title corresponding to the raw location data and returns the descriptive title to SCP 300. SCP 300 then substitutes the descriptive title for the raw location data. If the location data is in displayable form, in step 376d, SCP 300 forwards the location
5 data without involving mapping converter 304.

Having the location information and the name of calling party 101, SCP 300, in step 378, returns the name and location associated with the directory number of calling party 101 (along with call routing instructions) in a transaction capability application part (TCAP) response 351 to central office 106 through CCS7 Network
10 110 and STP 108. In step 380, central office 106 terminates the call to called party 102, sending the name, directory number, and location of calling party 101. Finally, in step 382, the information, including the location of calling party 101, is displayed on called party's display unit 117, along with the date and time of the call as generated by display unit 117.

15 In delivering location information, the present invention is compatible with most conventional CNAM display units. CNAM display units typically have a screen of three to four lines of text displaying 14 characters each, and can accept up to 256 characters in each TCAP message. If a CNAM delivers a calling party's name, directory number, and time and date of the call, as well as the location
20 information of the present invention, the CNAM display unit preferably contains a screen of four lines to accommodate these four items of information. If the CNAM display unit contains only three lines, preferably the unit provides means for

scrolling through the text. In either case, because conventional CNAM display units accommodate a TCAP message containing as many as 256 characters, the units have existing capacity with which to display location information. Thus, the present invention carries the advantage of not requiring the procurement of
5 additional hardware, *i.e.*, display units.

In an alternate preferred embodiment of the present invention, calling party 101 and called party 102 are wireless device users, both associated with the same wireless network or different wireless networks. In this embodiment, for a wireless to wireless call between calling party 101 and called party 102, the method and
10 system of location delivery occurs as outlined above, except that wireless components are used in the system architecture and wireless protocols (*e.g.*, Wireless Intelligent Network (WIN)) are used instead of wireline protocols (*e.g.*, AIN).

The foregoing disclosure of embodiments of the present invention has been
15 presented for purposes of illustration and description. It is not intended to be exhaustive or to limit the invention to the precise forms disclosed. Many variations and modifications of the embodiments described herein will be obvious to one of ordinary skill in the art in light of the above disclosure. The scope of the invention is to be defined only by the claims appended hereto, and by their equivalents.